

NOTICE - WHEN GOVERNMENT DRAWINGS, SPECIFICATIONS, OR OTHER DATA ARE USED FOR ANY PURPOSE OTHER THAN IN CONNECTION WITH A DEFINITELY RELATED GOVERNMENT PROCUREMENT OPERATION, THE UNITED STATES GOVERNMENT THEREBY INCURS NO RESPONSIBILITY NOR ANY OBLIGATION WHATSOEVER, AND THE FACT THAT THE GOVERNMENT MAY HAVE FORMULATED, FURNISHED, OR IN ANY WAY SUPPLIED THE SAID DRAWINGS, SPECIFICATIONS OR OTHER DATA IS NOT TO BE REGARDED BY IMPLICATION OR OTHERWISE AS IN ANY MANNER LICENSING THE HOLDER OR ANY OTHER PERSON OR CORPORATION, OR CONVEYING ANY RIGHTS OR PERMISSION TO MANUFACTURE, USE, OR SELL ANY PATENTED INVENTION THAT MAY IN ANY WAY BE RELATED THERETO.

REQUIREMENTS:

1. GENERAL:

- INTERPRET DRAWING IN ACCORDANCE WITH STANDARDS PRESCRIBED BY MIL-D-70327.
- UNITS SHALL MEET THE REQUIREMENTS OF MIL-C-3098 WITH THE EXCEPTIONS AND ADDITIONS SPECIFIED HEREIN.
- THE SUPPLIER SHALL CONFORM TO THE QUALITY ASSURANCE PROVISIONS AS CONTAINED IN ND 1015401, CLASS 2.
- PACKAGING AND PACKING: PACKAGING AND PACKING SHALL BE IN ACCORDANCE WITH MIL-C-3098, LEVEL A IN BOTH INSTANCES.

2. ACCEPTANCE AND INSPECTION: INSPECTION AND TEST PROCEDURE SHALL BE IN ACCORDANCE WITH

A. MECHANICAL REQUIREMENTS:

- MARKING: SAMPLE PER MIL-STD-105, LEVEL I, AQL OF 4 PERCENT.
 - PACKAGING AND PACKING SHALL BE MARKED IN ACCORDANCE WITH MIL-STD-129 BOTH INTERNALLY AND EXTERNALLY WITH THE MANUFACTURER'S NAME, NASA DRAWING NUMBER AND REVISION LETTER, LOT NUMBER OR CODE, AND DATE OF MANUFACTURE.
 - UNITS SHALL BE MARKED IN ACCORDANCE WITH ND 1002019 WITH THE MANUFACTURER'S NAME, NASA DRAWING NUMBER AND REVISION LETTER, SERIAL NUMBER, DATE OF MANUFACTURE, NOMINAL FREQUENCY AND TURN-OVER TEMPERATURE.

- DIMENSIONS: IN ACCORDANCE WITH OUTLINE. 100 PERCENT OF UNITS PROCURED SHALL BE INSPECTED FOR THIS REQUIREMENT.

- LEAD MATERIAL: LEAD MATERIAL SHALL BE IRON-NICKEL-COBALT ALLOY (KOVAR) IN ACCORDANCE WITH PS 1015402. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.

- LEAD SOLDERING: LEADS SHALL BE SOLDERED TO WITHSTAND FULL SOLDERING AND WELDING OPERATIONS. THE SOLDER SHALL BE EUTECTIC LEAD-TIN (60/40) OR EUTECTIC LEAD-SILVER (37/63) AND SHALL BE APPLIED TO THE LEADS AS A RESULT OF THE SOLDERING OPERATION.

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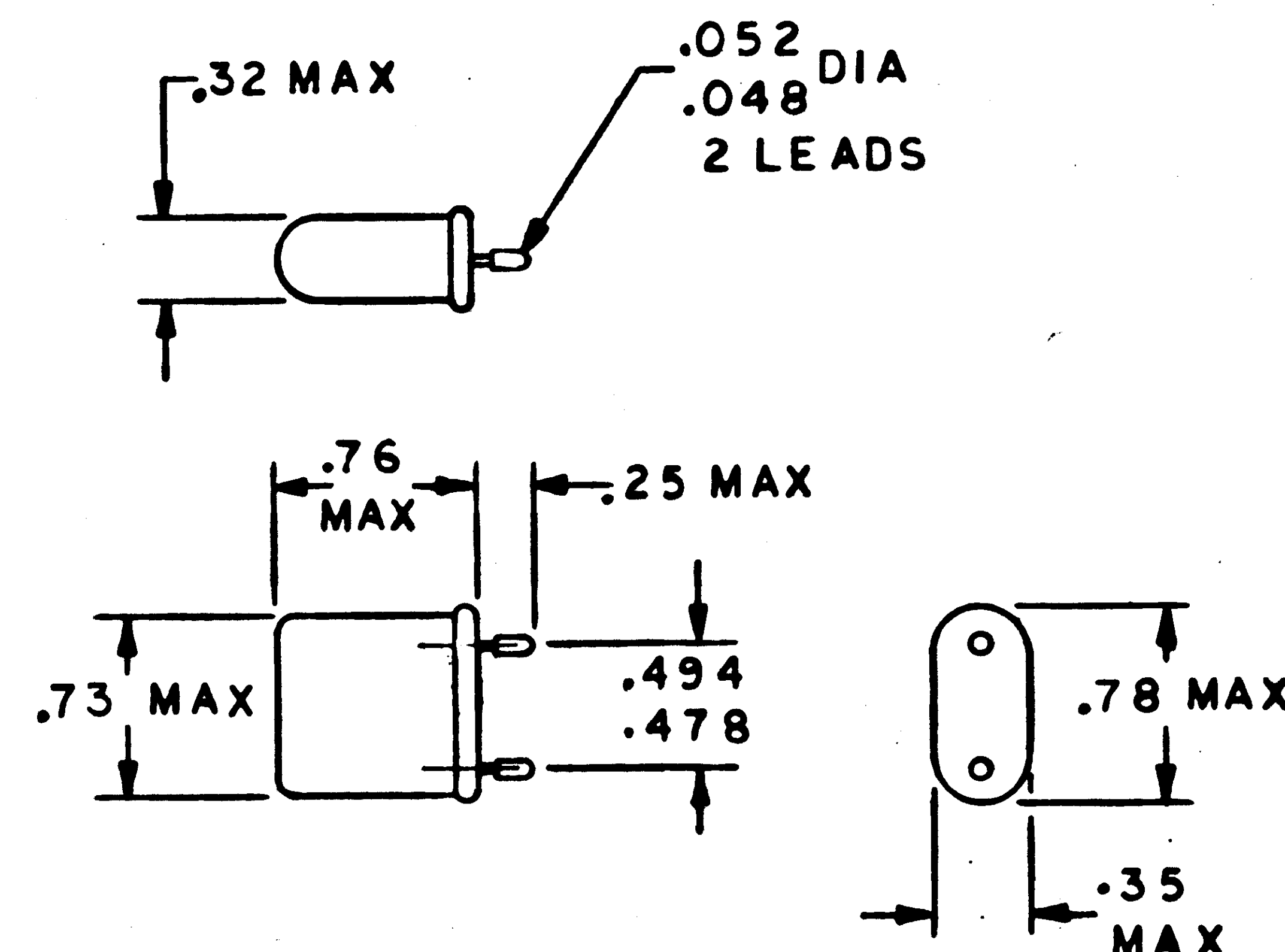
- CRYSTAL MOUNTING: THE CRYSTAL MOUNTING SHALL BE RUGGEDIZED TO ENABLE UNIT TO MEET THE REQUIREMENTS SPECIFIED HEREIN.

PROCURE ONLY FROM APPROVED SOURCES LISTED IN ND 1002034 FOR THIS DRAWING.

PASTE

- B. ELECTRICAL CHARACTERISTICS: THE FOLLOWING ELECTRICAL CHARACTERISTICS SHALL BE INSPECTED ON 100 PERCENT OF UNITS PROCURED. THE TEST SHALL BE PERFORMED WITH 50 MICROWATTS MAX DRIVE AND 25 PLUS OR MINUS 1 DEGREE CENTIGRADE UNLESS OTHERWISE SPECIFIED.

- FREQUENCY: 2.048000 MEGACYCLES PLUS OR MINUS .001 PERCENT, CALIBRATED IN A STANDARD 330 CI METER AT 80 MICROMICROFARADS LOAD CAPACITANCE.
- SERIES RESISTANCE: 30 OHMS MAXIMUM FROM ZERO DEGREES CENTIGRADE TO 85 DEGREES CENTIGRADE; 50 OHMS MAXIMUM FROM MINUS 20 DEGREES CENTIGRADE TO ZERO DEGREES CENTIGRADE.
- MOTIONAL CAPACITANCE: $C_1 = .01296$ uuf PLUS 5% MINUS 10%
- SHUNT CAPACITANCE: $C_0 = 5$ PICO FARADS PLUS OR MINUS 1 PICO FARAD.
- TEMPERATURE CHARACTERISTIC: TURN-OVER TEMPERATURE SHALL BE BETWEEN 63 DEGREES CENTIGRADE AND 67 DEGREES CENTIGRADE MAXIMUM FREQUENCY DEVIATION SHALL BE LESS THAN 15 PARTS PER MILLION OVER THE TEMP RANGE OF -10°C TO $+70^{\circ}\text{C}$



QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	FIND NO.
LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS. DWS. NO. CONTRACT		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>[Signature]</i> DATE <i>2/2/62</i> CHECKED <i>[Signature]</i> DATE <i>2/2/62</i> APPROVAL <i>[Signature]</i> DATE <i>2/2/62</i>		CRYSTAL UNIT, QUARTZ	
DO NOT SCALE THIS DRAWING		SPECIFICATION CONTROL DRAWING	
MATERIAL SEE NOTES		NASA DRAWING NO. 1006847	
HEAT TREATMENT		CODE IDENT NO. 80230	
FINAL FINISH		SIZE C	
NEXT ASSY USED ON		SCALE NONE	
APPLICATION		SHEET 1 OF 2	

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3. DESIGN REQUIREMENTS:

- A. **SHELF LIFE:** UNITS SHALL BE CAPABLE OF OPERATING WITHIN THE REQUIREMENTS SPECIFIED HEREIN AFTER ONE YEAR OF UNPACKAGED STORAGE UNDER THE FOLLOWING CONDITIONS: RELATIVE HUMIDITY UP TO 95 PERCENT, TEMPERATURES AS LOW AS MINUS 18 DEGREES CENTIGRADE OR AS HIGH AS PLUS 52 DEGREES CENTIGRADE, AND AT ALTITUDES AS HIGH AS 10,000 FEET. IT SHALL BE ASSUMED THAT THE UNITS WILL BE EXPOSED TO AMBIENT ATMOSPHERE DURING THE ONE YEAR PERIOD.
- B. **PACKAGED STORAGE:** UNITS SHALL BE CAPABLE OF OPERATING WITHIN THE REQUIREMENTS SPECIFIED HEREIN AFTER 3 YEARS OF DEAD STORAGE WHEN PACKAGED FOR OVERSEAS SHIPMENT IN ACCORDANCE WITH SPECIFICATION JAN-P-100-1. ENVIRONMENTAL CONDITIONS FOR PACKAGED STORAGE SHALL BE AS INDICATED FOR ALL NON-OPERATING CONDITIONS SPECIFIED ABOVE EXCEPT THE STORAGE TEMPERATURE MAY BE AS HIGH AS PLUS 71 DEGREES CENTIGRADE OR AS LOW AS MINUS 40 DEGREES CENTIGRADE, THERE MAY BE VIBRATORY ACCELERATION FOR PERIODS OF 25 HOURS OF 1.0G FROM 2 TO 30 CYCLES PER SECOND AND THERE MAY BE OCCASIONAL SHOCKS UP TO 10G.
- C. **LEAD TENSION:** LEADS SHALL BE CAPABLE OF WITHSTANDING AN AXIAL PULL OF 4 POUNDS MINIMUM. NO MECHANICAL DAMAGE OR LACK OF PERFORMANCE SHALL BE EVIDENCED AS A RESULT OF THIS TEST. SAMPLE PER MIL-STD-105, LEVEL I, AQL OF 4 PERCENT.
- D. **SPURIOUS MODES:** ALL SPURIOUS MODES SHALL BE AT LEAST 3.5 DECIBELS DOWN FOR PLUS OR MINUS 100 KILOCYCLES FROM THE DRIVE LEVEL AT 2.048 MEGACYCLES OVER THE TEMPERATURE RANGE FROM ZERO DEGREES CENTIGRADE TO PLUS 85 DEGREES CENTIGRADE.
- E. **CRYSTAL ELEMENT:** QUARTZ, "AT" CUT, GOLD OR ALUMINUM PLATED. A CERTIFICATE OF COMPLIANCE WITH THIS REQUIREMENT SHALL ACCOMPANY EACH SHIPMENT.
- F. **ENVIRONMENTAL REQUIREMENTS:** UNITS SHALL BE CAPABLE OF WITHSTANDING THE FOLLOWING ENVIRONMENTAL TESTS. MECHANICAL TESTS (VIBRATION, SHOCK AND ACCELERATION) SHALL BE CONDUCTED WITH THE UNIT MOUNTED BY MEANS OF AN APPROPRIATE FIXTURE WITH THE BODY RESTRAINED FROM MOVEMENT.

- (1) **VIBRATION:** WHILE OPERATING FROM 15 TO 31 CYCLES PER SECOND AT 0.2 INCH DOUBLE AMPLITUDE: FROM 31 TO 2,000 CYCLES PER SECOND AT PLUS OR MINUS 10G. FREQUENCY CHANGE DURING VIBRATION SHALL BE NO GREATER THAN PLUS OR MINUS ONE (1) PART PER 10⁷. A RESONANCE SEARCH SHALL BE MADE THROUGHOUT THE FREQUENCY RANGE SPECIFIED AND A 15 MINUTE FATIGUE VIBRATION TEST SHALL BE PERFORMED AT EACH MAJOR RESONANCE. PERMANENT FREQUENCY CHANGE AFTER VIBRATION SHALL BE NO GREATER THAN PLUS OR MINUS ONE (1) PART PER 10⁸.

- (2) **MECHANICAL SHOCK:** WHILE OPERATING, 50G FOR 11 MILLI-SECONDS PLUS OR MINUS ONE (1) MILLISECOND DURATION SIMILAR TO THAT OBTAINED WITH A BARRY TYPE SHOCK MACHINE PER MIL-STD-202 3 SHOCKS IN EACH OF THE 3 MUTUALLY PERPENDICULAR PLANES FOR A TOTAL OF 18 SHOCKS. PERMANENT FREQUENCY CHANGE AFTER SHOCK SHALL BE NO GREATER THAN PLUS OR MINUS 2 PARTS PER 10⁸.
- (3) **ACCELERATION:** WHILE OPERATING AND NON-OPERATING, PLUS OR MINUS 20G IN ANY DIRECTION FOR 5 MINUTES. PERMANENT FREQUENCY CHANGE AFTER ACCELERATION SHALL BE NO GREATER THAN 1 PART PER 10⁸.
- G. **AGING:** PLUS 1 PART PER 10⁸ PER WEEK MAXIMUM AT PLUS 60 DEGREES CENTIGRADE 50 MICROWATTS CRYSTAL DRIVE.
- (1) **TEMPERATURE SHOCK:** MINUS 40 DEGREES CENTIGRADE FOR 30 MINUTES AND PLUS 85 DEGREES CENTIGRADE FOR 30 MINUTES. TIME INTERVAL CHANGING FROM ONE TEMPERATURE EXTREME TO THE OTHER SHALL NOT EXCEED 15 SECONDS. PERMANENT FREQUENCY CHANGE AFTER TEMPERATURE SHOCK SHALL BE NO GREATER THAN 1 PART 10⁷.

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LIST OF MATERIALS			
MIT INSTRUMENTATION LAB CAMBRIDGE, MASS.		MANNED SPACECRAFT CENTER HOUSTON, TEXAS	
DRAWN <i>Ray W. White</i> DATE <i>12 Sept 63</i> CHECKED <i>Ray W. White</i> DATE <i>12 Sept 63</i> APPROVAL <i>Edmund Hall</i> 13 Sept 63		CRYSTAL UNIT, QUARTZ	
HEAT TREATMENT		SPECIFICATION CONTROL DRAWING	
FINAL FINISH		NASA APPROVAL <i>John B. ...</i>	
NEXT ASSY		NASA DRAWING NO. 1006847	
USED ON		CODE IDENT NO. 80230	
APPLICATION		SIZE C	
		SCALE NONE	
		WT	
		SHEET 2 OF 2	

MASTER